ENERGY CHALLENGES: Opportunities for Sustainable & Sustained Growth

Toronto Forum for Global Cities

October 24, 2011

Commissioner Daniel S. Sullivan
Alaska Department of Natural Resources
www.dnr.alaska.gov

AGENDA

1. Introduction to Alaska

2. Sustainable & Responsible Resource Development

3. Advances in Technology

4. Investment Opportunities: Examples of Clean Energy Projects in Alaska

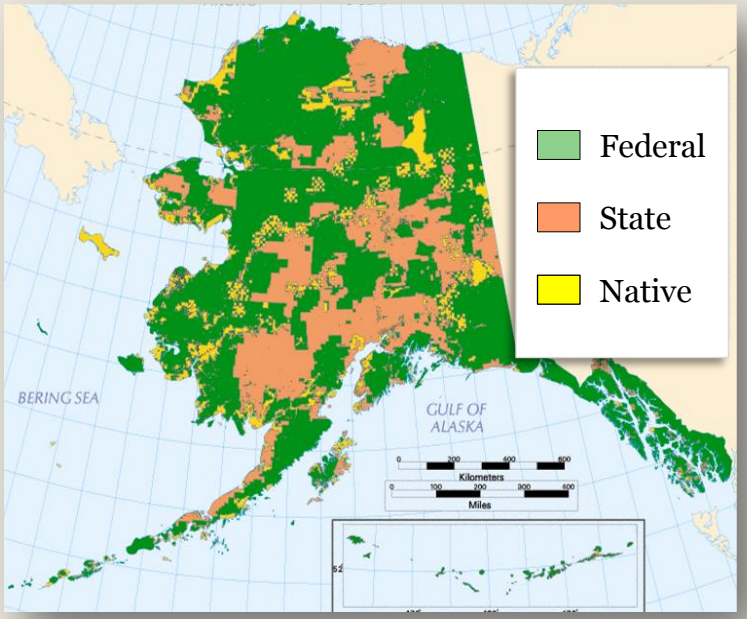
Part One

INTRODUCTION TO ALASKA

State *of* Alaska

Land Base

- Encompasses 586,412 square miles—twice the size of Texas
- Is larger than all but 18 sovereign nations
- Has more coastline than all other U.S. states combined
- Has more than 3 million lakes and half of the word's glaciers
- Is the least densely populated U.S. state

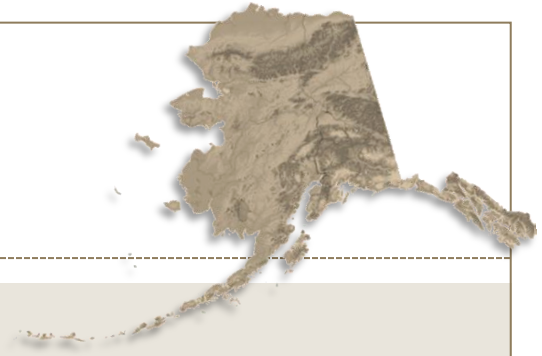


Land Ownership

- *Federal:* more than 200 million acres
- *State:* Approx. 100 million acres of uplands, 60 million acres of tidelands, shore lands, and submerged lands, and 40,000 miles of coastline
- *Native Corporation:* 44 million acres

State *of* Alaska

As a Storehouse: Hydrocarbons, Minerals, Timber, &Water



Oil: 40 billion barrels of undiscovered, technically recoverable reserves on the NS and OCS

Gas: 236 trillion cubic feet of undiscovered, technically recoverable natural gas on the NS and OCS

Coal: 17% of the world's coal; *2nd most in the world*

Copper: 6% of the world's copper; *3rd most in the world*

Lead: 2% of the world's lead; *6th most in the world*

Gold: 3% of the world's gold; *7th most in the world*

Zinc: 3% of the world's zinc; *8th most in the world*

Silver: 2% of the world's silver; *8th most in the world*

Rare earth elements: over 70 occurrences

Timber: 17% of U.S. forest land

Water: ~40% of U.S. fresh water

USGS global resource assessments

Part Two

SUSTAINABLE & RESPONSIBLE RESOURCE DEVELOPMENT

State *of* Alaska

Robust Environmental Standards

- The State of Alaska has an exceptional record of responsibly developing our resources while protecting the environment
- Oil and gas development in Alaska is conducted in a safe and responsible manner with some of the most stringent standards in the world
  - "Best Interest Findings"
  - "No impact exploration"
  - No operations can be conducted within one mile of polar bear dens
  - The state will not lease acreage in sensitive areas
  - The state encourages the unitization of leases
  - Whenever possible, onshore pipelines are buried to minimize impacts on wildlife – if pipelines are built above ground, they are elevated so caribou can migrate
  - Alaska mandates that operators use the best available technology for oil discharge containment, storage, transfer, and cleanup
  - Nearly 50 years of operations in Cook Inlet have coexisted with world-class fisheries

State *of* Alaska

Robust Environmental Standards

- Responsible resource development and protecting the environment go hand in hand
- Our efforts to protect the environment and wildlife have been successful. For example:
  - When debating the development of the Trans-Alaska Pipeline System (TAPS), many predicted that oil and gas development would decimate caribou herds
  - These predictions have not come true
  - In fact, caribou have thrived over the past 35 years. The Central Arctic caribou herd, which occupies summer ranges surrounding Prudhoe Bay—*the largest oil field in North America*—has grown from 5,000 in 1975 to over 66,000 today

Because of efforts taken by federal, state, and local governments and the energy industry, oil and gas development in Alaska is conducted in a safe and responsible manner with standards that exceed most other jurisdictions in the world.

Part Three

ADVANCES IN TECHNOLOGY

State *of* Alaska

Exploration & Drilling Technology

Minimal Impact During Exploration

- Advances in technology allow for minimal impact during the exploration phase of development
- For instance, onshore exploration drilling occurs only in the winter
  - Heavy equipment is brought out to remote sites on ice roads and the drilling rigs are assembled on ice pads
  - When the ice melts, there is no trace left of the pad—the only visible sign of prior activity is an eight-by-eight-foot well house that will remain on location because the well is part of a field under development and will one day produce oil
- In short, it is possible to explore for oil on the North Slope and leave no visible footprint

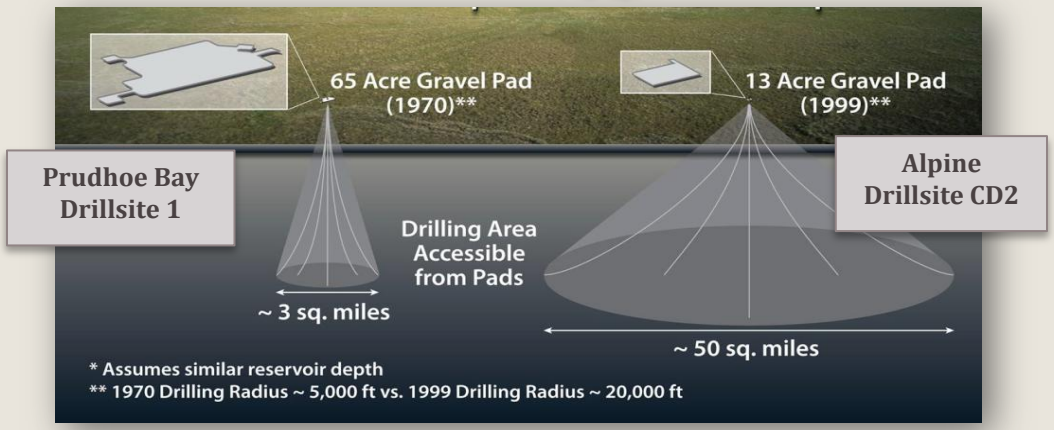
Photographs show an ice road and well sites on the North Slope during and after exploration. Note the minimal impact after exploration as shown below.

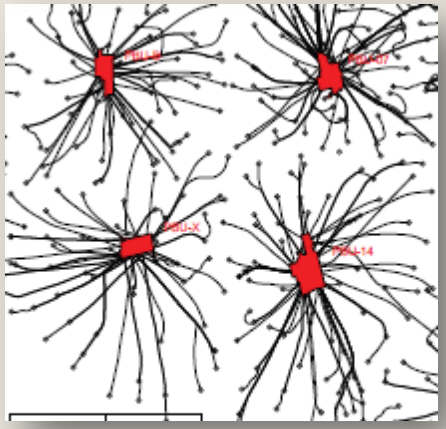
State *of* Alaska

Exploration & Drilling Technology

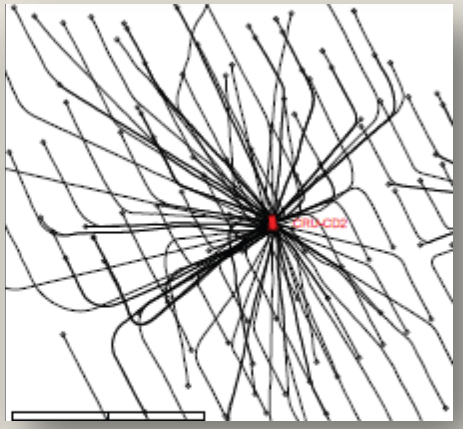
Drilling Technology

- Horizontal and multi-lateral drilling technology represents a cost-effective method to develop remaining oil
- Extended-reach horizontal drilling means that today, the same level of production can be achieved with fewer wells
- This means that not only more complicated stratigraphic plays can be developed, but also any formations can be more efficiently drilled and produced with a smaller number of wells





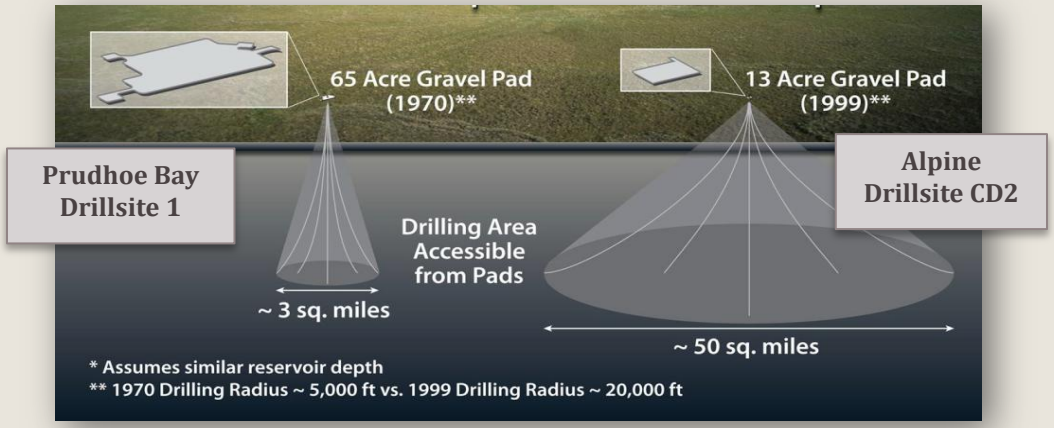
Prudhoe Bay



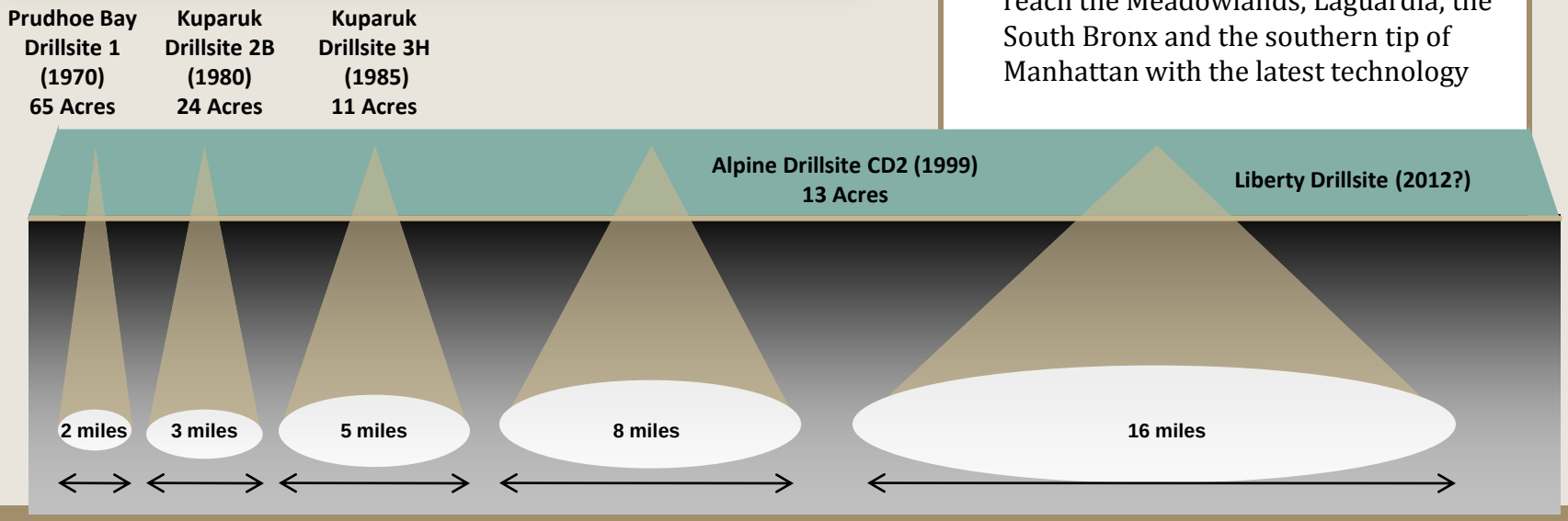
Alpine

State *of* Alaska

Exploration & Drilling Technology



- In 30 years, surface footprint requirements have been dramatically reduced. At the Alpine field, 54 wells have been drilled from one 13-acre pad
- Wells can also reach a much larger radius – from 3 sq. miles in 1970 to 50 sq. miles in 1999 and, perhaps, 100 sq. miles in 2012
- At a Central Park drill pad, wells could reach the Meadowlands, Laguardia, the South Bronx and the southern tip of Manhattan with the latest technology



Part Four

INVESTMENT OPPORTUNITIES:
Examples of Clean Energy Projects in Alaska

State *of* Alaska

Commercializing North Slope Gas

Progress on Commercializing North Slope Gas:

- 8 bcf/d currently reinjected at Prudhoe Bay
- Much of the upstream infrastructure is in place
- XOM and TransCanada have made substantial progress on progressing a large diameter gas pipeline
  - Environmental work; engineering; permitting; legal
- Open Season held last summer
- Point Thomson settlement
- Renewed focus from key stakeholders on monetizing the massive reserves of North Slope gas
- Gas pipeline will improve the economics of exploring and developing oil

State *of* Alaska

Clean Energy Projects

The State of Alaska has set a goal to have 50% of the state's electrical power come from clean and renewable sources by 2025

Hydro

- 37 hydro-electric projects currently provide power to Alaska utility customers, totaling an installed capacity of 423 Megawatts
- Today, hydropower provides 24% of statewide electrical power
- Many rural communities located along major rivers are interested in using river current for generating power with low-impact turbines that would act much like an underwater wind turbine

Wind

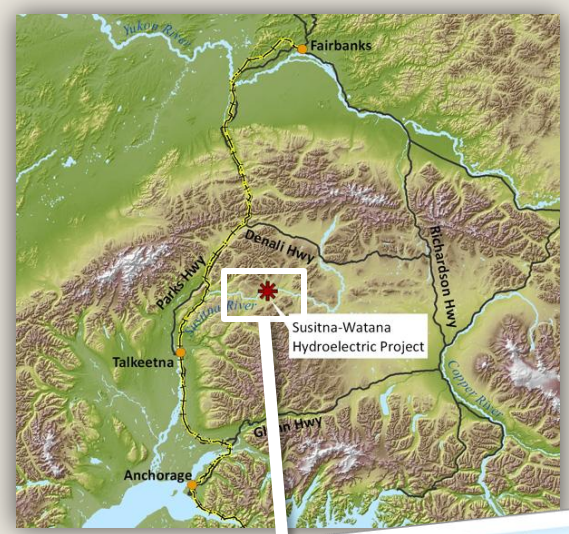
- Wind turbines have been installed in communities throughout rural Alaska, decreasing reliance on expensive diesel for energy
- Anchorage and Fairbanks are permitting two wind farms that could generate 5% of the Railbelt's electricity needs

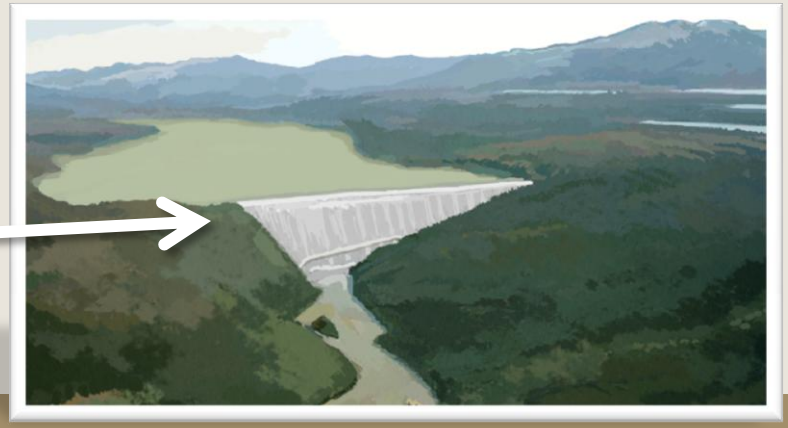
Tidal & Wave

- With 44,000 miles of coastline and some of the largest tidal ranges in the world, Alaska has enormous potential to develop ocean energy as a viable renewable source of electricity
- The total wave power flux on southern Alaska's coast alone is estimated at 1,250 TWh per year, about 300 times the amount of electricity used by Alaskans annually

State *of* Alaska

Investment Opportunities





Project Spotlight:

Susitna-Watana Dam in Southcentral Alaska

- State of Alaska has committed $66 million for the project, est. to cost a total of $4.5 billion
- Will be able to provide for nearly 50% of power for the majority Alaska's population
- 700-foot high dam
- Installed capacity would be 600 Megawatts
- Annual average 2600 Gigawatt hours
- Regulation and licensing is our biggest hurdle
- Estimated operation date by 2022-2023